



Pretest

Before you begin Lesson 1, you may want to get an idea of what you know and what you need to learn. The pretest will answer some of these questions for you. The pretest is 50 multiple-choice questions covering the topics in this book. While 50 questions can't cover every concept, skill, or shortcut taught in this book, your performance on the pretest will give you a good indication of your strengths and weaknesses.

If you score high on the pretest, you have a good foundation and should be able to work your way through the book quickly. If you score low on the pretest, don't despair. This book will take you through the calculus concepts, step by step. If you get a low score, you may need to take more than 20 minutes a day to work through a lesson. However, this is a self-paced program, so you can spend as much time on a lesson as you need. You decide when you fully comprehend the lesson and are ready to go on to the next one.

Take as much time as you need to do the pretest. When you are finished, check your answers with the answer key at the end of the pretest. Along with each answer is a number that tells you which lesson of this book teaches you about the calculus skills needed for that question. You will find the level of difficulty increases as you work your way through the pretest.

ANSWER SHEET

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1. What is the value of $f(4)$ when

$$f(x) = 3x^2 - \sqrt{x}?$$

- a. 44
- b. 46
- c. 140
- d. 142

2. Simplify $g(x + 3)$ when $g(x) = x^2 - 2x + 1$.

- a. $x^2 + 4x + 4$
- b. $x^2 - 2x + 4$
- c. $x^2 - 2x + 13$
- d. $x^2 + 4x + 10$

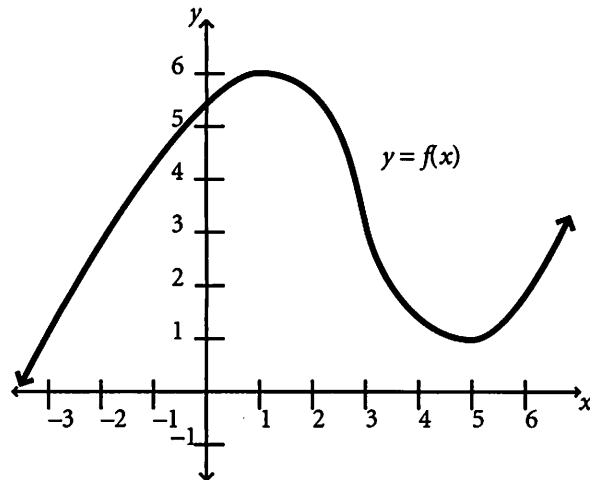
3. What is $f \circ g(x)$ when $f(x) = x - \frac{2}{x}$ and $g(x) = x + 3$?

- a. $x - \frac{2}{x} + 3$
- b. $2x - \frac{2}{x} + 3$
- c. $x^2 - 2 + 3x - \frac{6}{x}$
- d. $x + 3 - \frac{2}{x + 3}$

4. What is the domain of $h(x) = \frac{x}{x^2 - 1}$?

- a. $x \neq 1$
- b. $x \neq 0$
- c. $x \neq -1$ and $x \neq 1$
- d. $x \neq -1, x \neq 0$, and $x \neq 1$

Use the following figure for questions 5 and 6.



5. Where is $f(x)$ increasing?

- a. $(-\infty, 1)$ and $(5, \infty)$
- b. $(1, 5)$
- c. $(1, 6)$
- d. $(5, \infty)$

6. Where does $f(x)$ have a point of inflection?

- a. $(0, 5.5)$
- b. $(1, 6)$
- c. $(3, 3)$
- d. $(5, 1)$

7. What is the equation of the straight line through $(2, 5)$ and $(-1, -1)$?

- a. $y = 2x + 5$
- b. $y = 2x + 1$
- c. $y = -2x + 9$
- d. $y = -2x - 3$

8. Simplify $64^{\frac{1}{3}}$.

- a. 4
- b. 8
- c. 32
- d. 4,096

9. Simplify 2^{-3} .

- a. $\frac{1}{8}$
- b. 8
- c. -8
- d. -6

10. Solve for x when $3^x = 15$.

- a. 5
- b. $\ln(5)$
- c. $\frac{\ln(15)}{\ln(3)}$
- d. $\ln(12)$

11. Evaluate $\sin\left(\frac{\pi}{3}\right)$.

- a. $-\frac{1}{2}$
- b. $\frac{1}{2}$
- c. $\frac{\sqrt{2}}{2}$
- d. $\frac{\sqrt{3}}{2}$

12. Evaluate $\tan\left(\frac{3\pi}{4}\right)$.

- a. -1
- b. 1
- c. $\frac{\sqrt{2}}{2}$
- d. $\sqrt{2}$

13. Simplify $\lim_{x \rightarrow 4} \frac{x^2 - 1}{x^2 + 1}$.

- a. -1
- b. $\frac{3}{5}$
- c. $\frac{15}{17}$
- d. $\frac{7}{9}$

14. Simplify $\lim_{x \rightarrow 1} \frac{x - 1}{x^2 - 1}$.

- a. -1
- b. 1
- c. $\frac{1}{2}$
- d. undefined

15. Evaluate $\lim_{x \rightarrow 2^-} \frac{x + 3}{x - 2}$.

- a. ∞
- b. $-\infty$
- c. $-\frac{1}{4}$
- d. undefined

16. What is the slope of $f(x) = 3x + 2$ at $x = 5$?

- a. 2
- b. 17
- c. $3x$
- d. 3

17. What is the slope of $g(x) = x^2 + 2x - 1$ at $x = 3$?

- a. 2
- b. 8
- c. 14
- d. $2x + 2$

18. Differentiate $h(x) = 4x^3 - 5x + 1$.

- a. $12x^2$
- b. $12x^2 - 5$
- c. $12x^2 - 5x$
- d. $12x^2 - 5x + \frac{1}{x}$

19. The height of a certain plant is $41 - \frac{40}{t}$ inches after $t \geq 1$ weeks. How fast is it growing after two weeks?

- a. 5 inches per week
- b. 10 inches per week
- c. 21 inches per week
- d. 31 inches per week

20. What is the derivative of $y = x^2 - 3\cos(x)$?

- a. $\frac{dy}{dx} = 2x + 3\sin(x)$
- b. $\frac{dy}{dx} = 2x - 3\sin(x)$
- c. $\frac{dy}{dx} = 2x - 3\cos(1)$
- d. $\frac{dy}{dx} = 2x - 3\tan(x)$

21. Differentiate $f(x) = \ln(x) - e^x + 2$.

- a. $f'(x) = \ln(x) + e^x$
- b. $f'(x) = \ln(x) - e^x$
- c. $f'(x) = \frac{1}{x} + e^x$
- d. $f'(x) = \frac{1}{x} - e^x$

22. Differentiate $g(x) = x^2\sin(x)$.

- a. $2x\cos(x)$
- b. $2x + \cos(x)$
- c. $2x\sin(x) + x^2\cos(x)$
- d. $2x\sin(x)\cos(x)$

23. Differentiate $\frac{\ln(x)}{x}$.

- a. 0
- b. $\frac{1}{x}$
- c. $\frac{1 - \ln(x)}{x^2}$
- d. $\frac{\ln(x) - 1}{x^2}$

24. Differentiate $y = \tan(x)$.

- a. $\sec^2(x)$
- b. $\csc(x)$
- c. $\frac{\cos^2(x) - \sin^2(x)}{\cos^2(x)}$
- d. $\sin(x)\cos(x)$

25. Differentiate $f(x) = e^{4x^2+7}$.

- a. e^{8x}
- b. e^{4x^2+7}
- c. $8xe^{4x^2+7}$
- d. $(4x^2 + 7)e^{4x^2-8}$

26. Differentiate $(x^2 - 1)^5$.

- a. $10x$
- b. $(2x)^5$
- c. $5(x^2 - 1)^4$
- d. $10x(x^2 - 1)^4$

27. Find $\frac{dy}{dx}$ if $y^2 + xy = x^3 + 5$.

- a. $\frac{dy}{dx} = x^2$
- b. $\frac{dy}{dx} = \frac{3x^2 - y}{2y + x}$
- c. $\frac{dy}{dx} = \frac{3x^2}{1 + 2y}$
- d. $\frac{dy}{dx} = \frac{3x^2 - 3y}{x}$

28. Find $\frac{dy}{dx}$ if $\sin(y) = 4x^2$.

- a. $\frac{dy}{dx} = 8x - \cos(y)$
- b. $\frac{dy}{dx} = 8x\cos(y)$
- c. $\frac{dy}{dx} = \cos(y) - 8x$
- d. $\frac{dy}{dx} = 8x\sec(y)$

29. What is the slope of $x^2 + y^2 = 1$ at $\left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$?

- a. -1
- b. 1
- c. $-\frac{\sqrt{3}}{3}$
- d. $\frac{\sqrt{3}}{3}$

30. If the radius of a circle is growing at 4 feet per second, how fast is the area growing when the radius is 10 feet?

- a. 20π square feet per second
- b. 80π square feet per second
- c. 100π square feet per second
- d. 400π square feet per second

31. The height of a triangle increases by 3 inches every minute while its base decreases by 1 inch every minute. How fast is the area changing when the triangle has a height of 10 inches and a base of 100 inches?

- a. It is increasing at 145 square inches per minute.
- b. It is increasing at 500 square inches per minute.
- c. It is decreasing at 1,500 square inches per minute.
- d. It is decreasing at 3,000 square inches per minute.

32. Evaluate $\lim_{x \rightarrow \infty} \frac{4x^2 - 5x + 2}{1 - x^2}$.

- a. 4
- b. -4
- c. 2
- d. undefined

33. Evaluate $\lim_{x \rightarrow -\infty} \frac{4x^5 + 6x + 4}{x^3 + 10x - 1}$.

- a. $-\infty$
- b. ∞
- c. -4
- d. 4

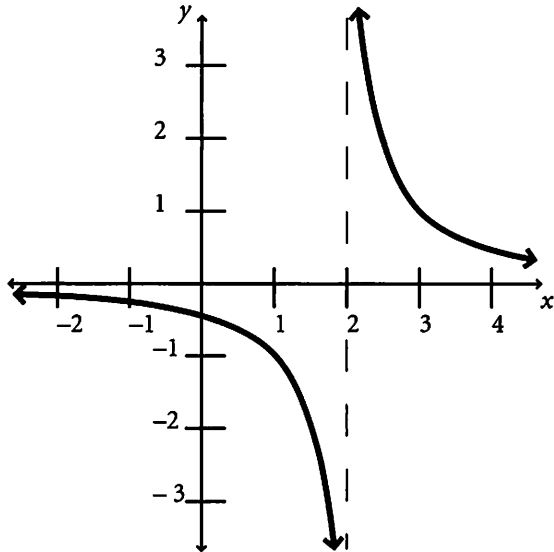
34. Evaluate $\lim_{x \rightarrow \infty} \frac{\ln(x)}{3x + 2}$.

- a. $\frac{1}{3}$
- b. 2
- c. 3
- d. 0

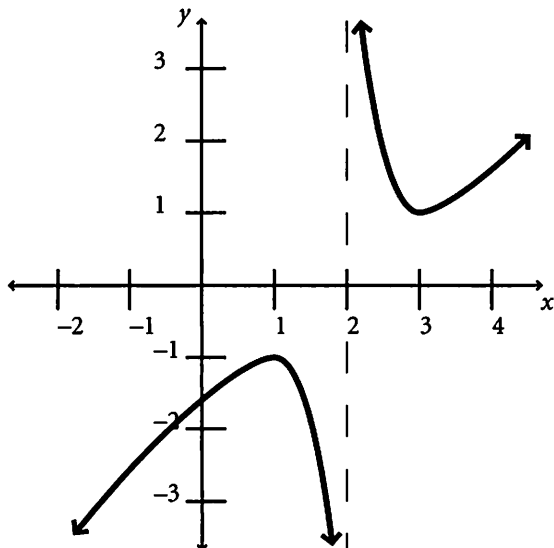
35. Which of the following is the graph of

$$y = \frac{1}{x-2}?$$

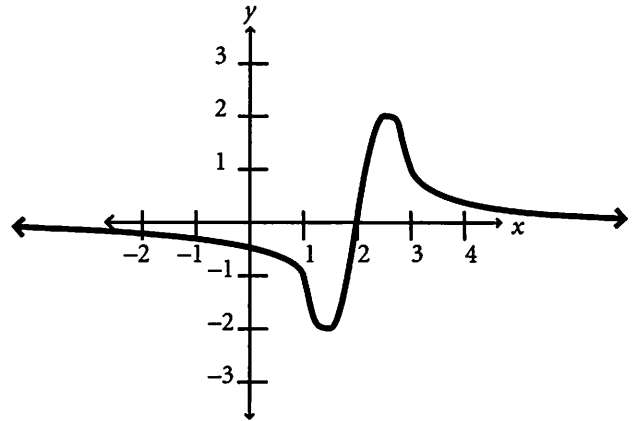
a.



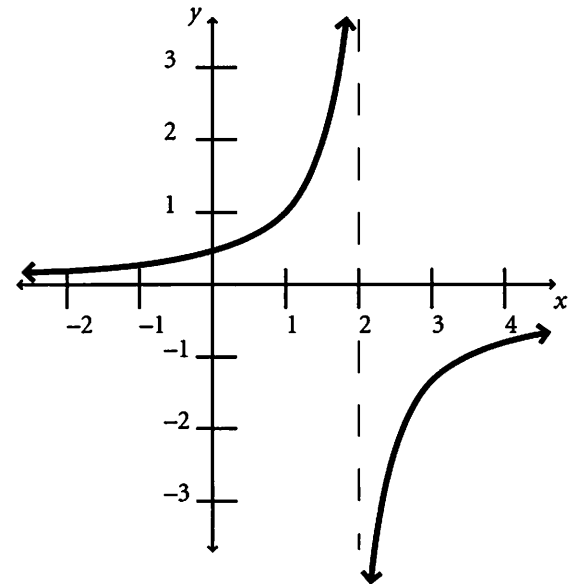
b.



c.



d.



36. Where is $g(x) = x^4 - 6x^2 + 5$ concave down?

- a. (1,12)
- b. (-6,5)
- c. $(-\sqrt{3}, \sqrt{3})$
- d. (-1,1)

37. A 5,000-pound block of ice melts at a rate of 200 pounds each day. If the price of ice is 5¢ a pound and increases by 1¢ each day, in how many days will the block have a maximal value?

- a. 5 days
- b. 10 days
- c. 15 days
- d. 20 days

38. A box with a square bottom and no top must contain 108 cubic inches. What dimensions will minimize the surface area of the box?

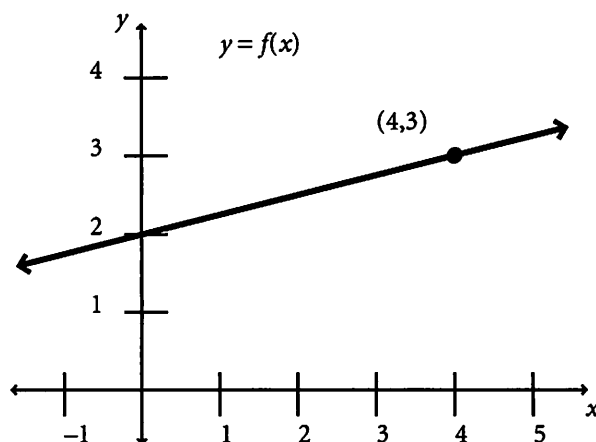
- a. $2 \times 2 \times 27$
- b. $8 \times 8 \times 3$
- c. $6 \times 6 \times 3$
- d. $4 \times 4 \times 6.75$

39. If $\int_3^8 g(x) dx = 5$ and $\int_3^5 g(x) dx = -4$, then

what is $\int_5^8 g(x) dx$?

- a. -20
- b. 1
- c. 3
- d. 9

40. What is $\int_0^4 f(x) dx$?



- a. 2
- b. 3
- c. 10
- d. 12

41. If $g(x)$ is the area under the curve $y = t^3 + 4t$ between $t = 0$ and $t = x$, what is $g'(x)$?

- a. $x^3 + 4x$
- b. $3x^2 + 4$
- c. $\frac{1}{4}x^4 + 2x$
- d. 0

42. Evaluate $\int (3x^2 + 8x + 5) dx$.

- a. $6x + 8$
- b. $6x + 8 + c$
- c. $x^3 + 4x^2 + 5x$
- d. $x^3 + 4x^2 + 5x + c$

43. Evaluate $\int_0^9 \sqrt{x} dx$.

- a. $\frac{1}{6}$
- b. 3
- c. 12
- d. 18

44. Evaluate $\int \sin(x) dx$.

- a. $\cos(x) + c$
- b. $-\cos(x) + c$
- c. $\sin(x) + c$
- d. $-\sin(x) + c$

45. Evaluate $\int \frac{x}{x^2 - 1} dx$.

- a. $\frac{\frac{1}{2}x^2}{\frac{1}{3}x^3 - x} + c$
- b. $\ln(x - 1) + c$
- c. $\ln(x^2 - 1) + c$
- d. $\frac{1}{2}\ln(x^2 - 1) + c$

46. Integrate $\int e^{5x} dx$.

- a. $\frac{1}{5}e^{5x} + c$
- b. $e^{5x} + c$
- c. $e^5 + c$
- d. $\frac{1}{5}e^5 + c$

47. Evaluate $\int 4x^2 \cos(x^3) dx$.

- a. $4\sin(x^3) + c$
- b. $\frac{4}{3}\sin(x^3) + c$
- c. $\frac{4}{3}x^3\sin(x^3) + c$
- d. $\frac{4}{3}x^2\sin(x^3) + c$

48. Evaluate $\int_0^1 x(x^2 + 2)^5 dx$.

- a. 73
- b. 81
- c. $\frac{665}{12}$
- d. $\frac{81}{8}$

49. Integrate $\int x \ln(x) dx$.

- a. $\frac{1}{2}x^2 \ln(x) + c$
- b. $x \ln(x) - \ln(x) + c$
- c. $x^2 \ln(x) + \frac{1}{4}x^2 + c$
- d. $\frac{1}{2}x^2 \ln(x) - \frac{1}{4}x^2 + c$

50. Evaluate $\int x \sin(x) dx$.

- a. $-x \cos(x) + \sin(x) + c$
- b. $\frac{1}{2}x^2 \cos(x) + c$
- c. $-\frac{1}{2}x^2 \cos(x) + c$
- d. $-x \cos(x) + \cos(x) + c$